

## ***Epikopais* gen. nov. (Isopoda: Asellota: Munnopsidae), a new genus of munnopsid isopod with three new species from the south-western Pacific.**

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### **Abstract**

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A new munnopsid isopod genus from the southern hemisphere, *Epikopais* gen. nov. is described here and includes *Epikopais aries* (Vanhöffen, 1914) comb. nov. from Antarctica and three new species described here from the south-west Pacific: *Epikopais mystax* sp. nov. from the Bounty Trough east of the South Island of New Zealand; and *Epikopais poorei* sp. nov. and *Epikopais waringa* sp. nov., both from the south-eastern Australian continental slope. *Epikopais* gen. nov. can be distinguished by the combination of the short laterally rounded cephalic frons; the absence of dorsal spines; the lack of a mandibular palp; the mandibular fossa, which curves along the lateral margin of the mandible; and the biramous uropods.

### **Keywords**

Crustacea, Isopoda, Munnopsidae, *Epikopais*, deep-sea, Australia, New Zealand.

### **Introduction**

The earliest species from the isopod family Munnopsidae Lilljeborg, 1864 to be described from the south-west Pacific were *Vanhoeffenura novaezealandiae* (Beddard, 1885) and *Munnopsis gracilis* Beddard, 1885 which were both collected from off New Zealand during the round-the world voyage of the HMS *Challenger* in the early 1870's. Despite these early beginnings, few species of south-west Pacific Munnopsidae have since been described with the most being from the subfamily Ilyarachninae Hansen, 1916 (see Merrin 2004, Merrin 2006, Merrin and Bruce 2006, Merrin et al. 2009).

*Epikopais* gen. nov. is the seventh genus to be described from the subfamily Ilyarachninae and the second to be known exclusively from the southern hemisphere. The first, *Notopais* Hodgson, 1910, has been recorded from only waters around Antarctica, south-eastern Australia and New Zealand (Merrin 2004, Merrin and Bruce 2006). Two of the new species described in this paper, *Epikopais waringa* sp. nov. and *Epikopais poorei* sp. nov. were collected during Museum Victoria's SLOPE expeditions of south-eastern Australia between 1979 and 1988. These expeditions yielded a high diversity of isopod species (Poore et al. 1994) and many new species have been described in recent years (for example see Brandt 1994, Cohen & Poore 1994, Just 2001a, 2001b, 2009, Merrin and Poore 2003, Brix 2006). *Epikopais mystax* sp. nov. was collected from the Bounty Trough east of New Zealand.

The type material used in the preparation of the illustrations and descriptions are indicated in the figure captions. Specimens were drawn using a Nikon Optiphot-2 compound microscope and a Zeiss Stemi SV 11 dissecting microscope, both fitted with a camera lucida. Species descriptions were prepared using DELTA (Dallwitz et al. 1999). Ratios were calculated using the maximum lengths and widths of segments unless otherwise mentioned in the text. With antennal articles the most basal article is referred to as article 1, the next article as article 2 and so on. Directional information concerning pereopods follows Brusca et al. (1995).

### **Abbreviations**

SS simple seta/e; RS robust seta/e; NIWA National Institute for Water and Atmospheric Research, Wellington New Zealand; NMV Museum Victoria, Melbourne Australia.

### **Taxonomy**

#### **Family Munnopsidae Lilljeborg, 1864**

#### **Subfamily Ilyarachninae Hansen, 1916**

#### ***Epikopais* gen. nov.**

*Type species. Epikopais poorei* sp. nov., here designated.

**Diagnosis.** Cephalic frons short, laterally rounded; cephalon anterior flanges present; pereonites 1–4 margins with simple setae, dorsal spines absent; pereonites 5–7 lateral margins without elongate spines or jagged edges. Pleon without dorsal and anterolateral spines. Antennae positioned closely together, centrally; antenna 1 article 1 with one distal point, lateral flange absent; antenna 2 article 1 without anterolateral spine. Mandible incisor rounded, with no defined cusps; spine row either present or absent; lacinia mobilis and palp both absent; mandibular fossa curved along lateral margin of mandible; molar smaller than condyle, narrowing distally. Maxilla 2 middle and lateral lobes each distally with 4 long pectinate setae. Pereopod 2 ambulatory, not enlarged; pereopods 5 and 6 carpi expanded, flattened, sub-circular; propodi expanded, flattened, oar-like; pereopods 5–7 ischia superior margin, carpi and propodi inferior and superior margins each with row of plumose setae. Operculum large, with prominent medial keel, lateral margins setose; pleopod 4 exopod with one plumose seta; pleopod 5 simple lobe. Uropods biramous, with large exopod.

**Species included.** *Epikopais aries* (Vanhöffen, 1914) comb. nov.; *Epikopais mystax* sp. nov.; *Epikopais poorei* sp. nov.; and *Epikopais waringa* sp. nov.

**Remarks.** *Epikopais* gen. nov. can be distinguished by the combination of: the short laterally rounded cephalic frons; the absence of dorsal spines; the lack of a mandibular palp; the mandibular fossa, which curves along the lateral margin of the mandible; and the biramous uropods with a prominent exopod.

The laterally rounded shape of the cephalic frons is unique within the Ilyarachninae. In *Ilyarachna*, *Notopais* and *Bathybadistes* Hessler and Thistle, 1975, the cephalic frons is wide and almost rectangular in shape, and lack the lateral roundness found in *Epikopais*. In *Aspidarachna* Sars, 1897, the cephalic frons is very narrow with distance between the antennae and the labrum the smallest of all the Ilyarachninae. The shape of the mandibular fossa is also unique in the Ilyarachninae. The general shape of the mandibular fossa in this subfamily is angular and does not curve along the lateral margin of the mandible as it does in *Epikopais*.

Like *Epikopais*, *Notopais* and *Echinozone* Sars, 1897 also lack a mandibular palp and have biramous uropods. In addition to the differences found in the cephalic frons and the mandibular fossa, *Epikopais* can be distinguished from *Notopais* as it lacks the pronounced spine on the first article of antenna 2, and it can be distinguished from *Echinozone* as it lacks dorsal spines.

The only previously described species of this genus, *Epikopais aries*, is based on a single specimen collected from Antarctica and originally placed in *Aspidarachna*, by Vanhöffen (1914). This species was then moved to *Echinozone* by Hessler and Thistle (1975). Comparing the holotype of *E. aries* with the other species of *Epikopais* shows that this species belongs in *Epikopais*.

*Epikopais* is known from Antarctica, south-western Australia and New Zealand, at depths between 385–1586 metres.

**Etymology.** *Epikopais* is derived from the Greek word epikopos, meaning furnished with oars, in reference to the natatory pereopods of these animals.

### Key to the species of *Epikopais*

- Body not covered in setae; anterolateral cephalic flanges large; opercular keel wide, bulbous, not elongate ..... 2
- Body covered in setae; anterolateral cephalic flanges small; opercular keel elongate, not bulbous ..... *Epikopais poorei* sp. nov.
- Frons with elongate setae above labrum ..... 3
- Frons without elongate setae above labrum ..... *Epikopais aries* (Vanhöffen, 1914).
- Pereonites 5–7 together much longer than pereonites 1–4; pereonite 5 anterior margin with few setae; pereonite 7 anteriorly wide; operculum keel, wide, short, triangular ..... *Epikopais waringa* sp. nov.
- Pereonites 5–7 together sub-equal with pereonites 1–4; pereonite 5 anterior margin with many setae; pereonite 7 anteriorly narrowing; operculum keel longer, not triangular ..... *Epikopais mystax* sp. nov.

### *Epikopais poorei* sp. nov.

Figures 1–5

**Material examined.** All off south-eastern Australia. Holotype. Ovigerous female (2.4 mm), 44 km E of Nowra, NSW, stn SLOPE 56, 34°55.79'–56.06'S, 151°08.06'–07.86'E, 22 October 1988, WHOI epibenthic sled, 429–466 m, RV *Franklin*, muddy coarse shell (NMV J18844). Paratypes. 22 females, 21 males (1 male, 2.0 mm, dissected) 2 fragments, type locality (NMV J54112), 2 females (2.3 mm, dissected, 2.0 mm partially dissected), south of Point Hicks, Victoria, stn SLOPE 33, 38°19.60'S, 149°24.30'E, 23 July 1986, 930 m, WHOI epibenthic sled, RV *Franklin* (NMV J18845).

**Additional material.** 8 females, 7 males, 5 fragments, south of Point Hicks, Victoria, stn SLOPE 40, 38°17.70'S, 149°11.30'E, 24 July 1986, WHOI epibenthic sled, 400 m, RV *Franklin*, coarse sand, gravel, mud (NMV J18843).

**Description. Female.** Body length 2.1 times width of pereonite 2; cuticle not highly calcified, setose. Cephalon spines absent; anterior cephalic flanges small. Pereonites 1–4 anterior margins with few SS. Pereonite 5 anterior margin smooth; anterolateral margins of pereonites 4, 6 and 7 with small lobes; pereonite 6 ventrally with no ornamentation; pereonite 7 ventrally with pair of setae. Pleon length 0.9 times proximal width, with scattered SS.

Female antenna 1 of 9 articles; article 1 length 1.8 times width, mesial margin with 1 sensillate RS and 4 SS, surface with 4 SS, 2 penicillate setae and 1 sensillate RS, lateral margin with 7 SS, distal margin with 5 SS and 1 penicillate seta; article 2 length 0.6 times article 1, with 4 sensillate RS and 1 penicillate seta, distal extension with 2 penicillate setae; article 3 with 1 SS; article 4 with 2 penicillate setae; article 5 with 1 SS; terminal article with 1 penicillate seta and 2 SS.

Mandible spine row absent, molar distally with 4 serrate setae; socket-like structure with 1 SS at approximate place of mandibular palp. Maxilla 1 lateral and mesial margins with fine SS; lateral lobe width 1.5 times mesial lobe width, distal margin with few fine SS, 3 RS, 3 dentate RS and 6 pectinate

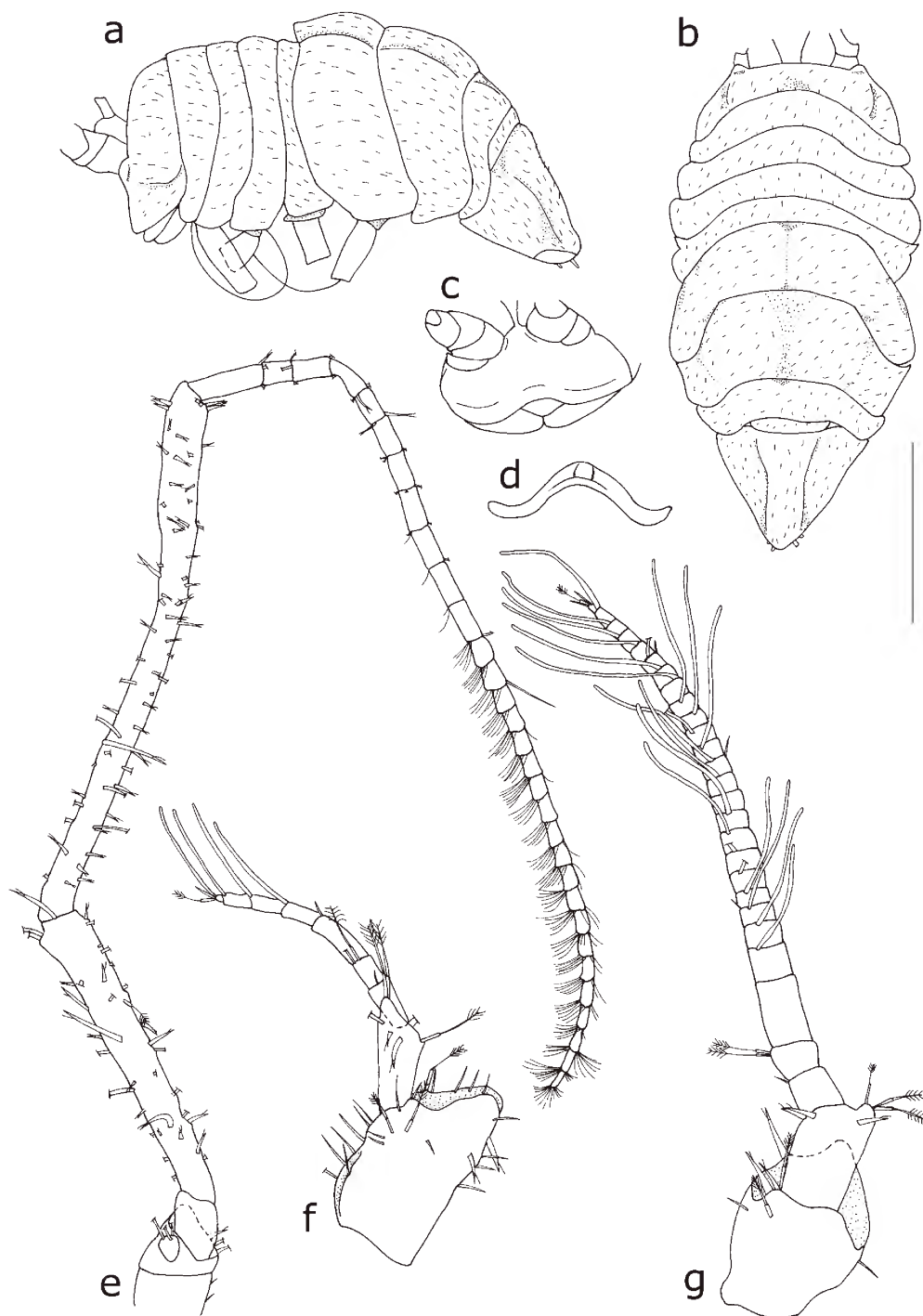


Figure 1. *Epikopais poorei* gen. nov., sp. nov. a–c, female holotype, 2.4 mm (NMV J18844); d, f, female paratype, 2.3 mm (NMV J18845); e, g, male paratype, 2.0 mm (NMV J54112): a, lateral view; b, dorsal view; c, cephalon; d, ventral view of pereonite 7; e, right antenna 2; f, left antenna 1; g, right antenna 1. Scale bar = 1 mm, for dorsal and lateral views only.

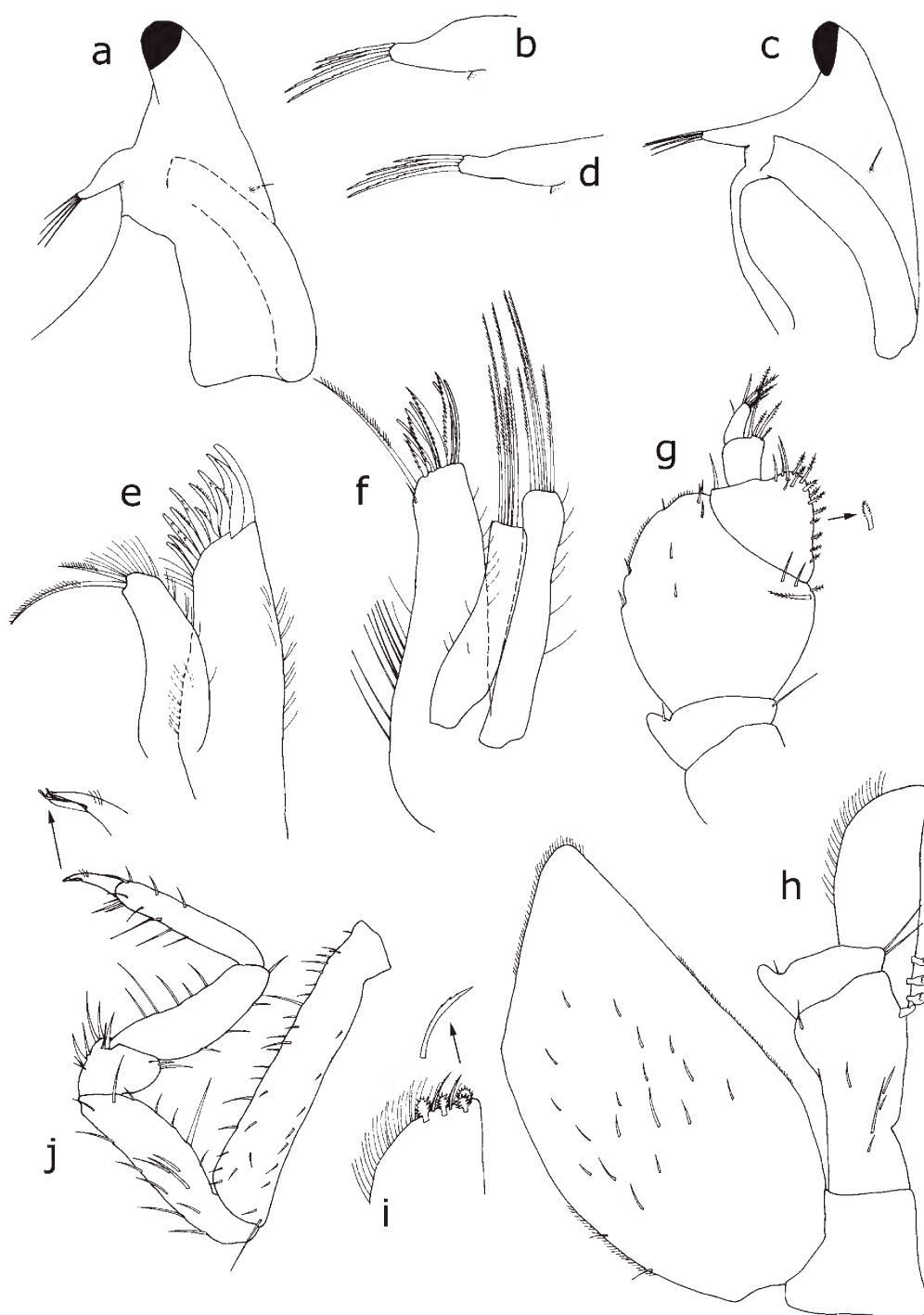


Figure 2. *Epikopais poorei* gen. nov., sp. nov. All figures from female paratype, 2.3 mm (NMV J18845): a, left mandible; b, left mandibular molar; c, right mandible; d, right mandible molar; e, left maxilla 1; f, left maxilla 2; g, right maxilliped palp; h, right maxilliped; i, right maxilliped endite; j, right pereopod 1.

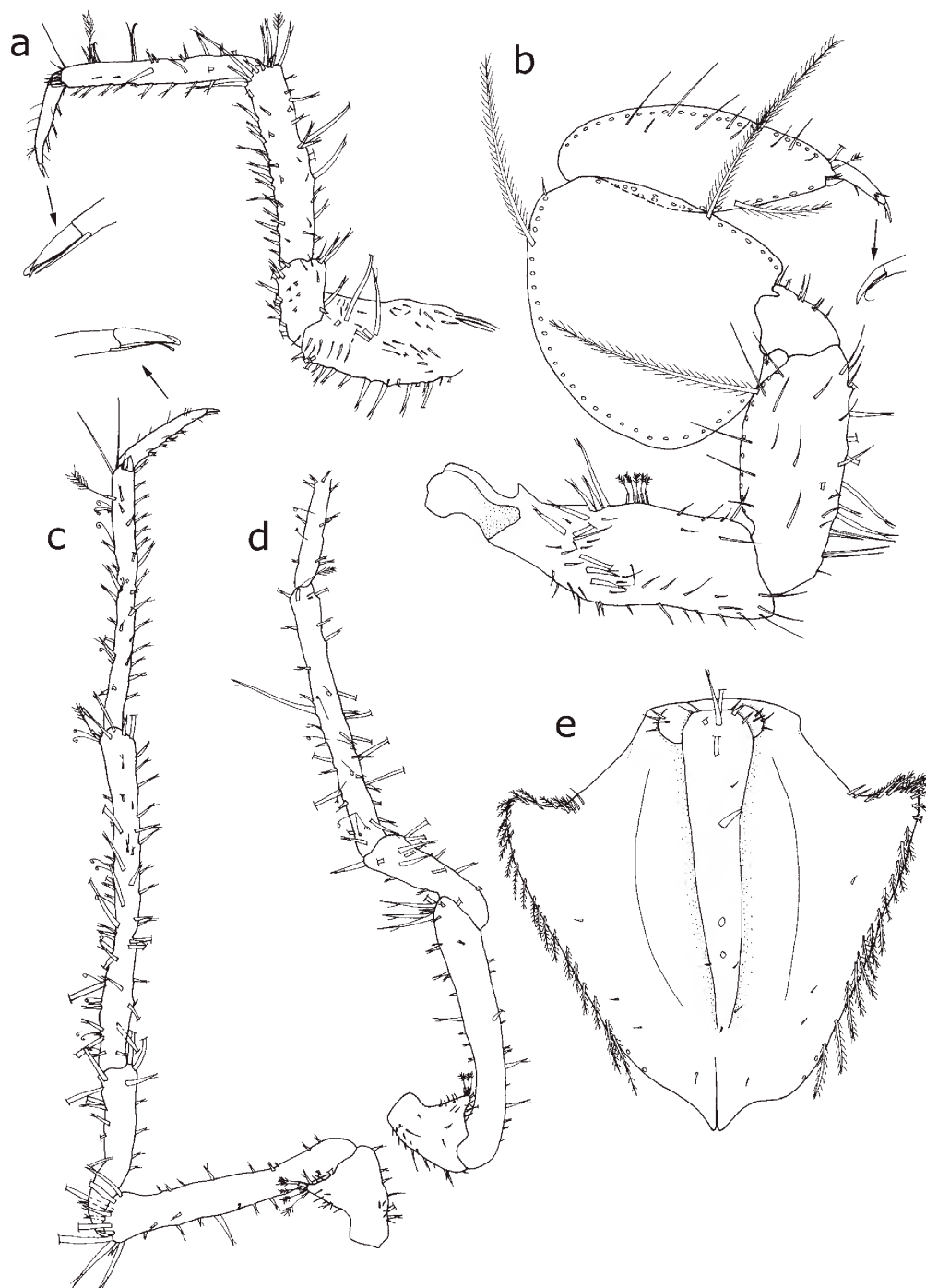


Figure 3. *Epikopais poorei* gen. nov., sp. nov. a–d, female paratype, 2.3 mm (NMV J18845); e, female paratype, 2 mm (NMV J18845): a, left pereopod 2; b, left pereopod 5; c, right pereopod 4; d, left pereopod 3; e, operculum.

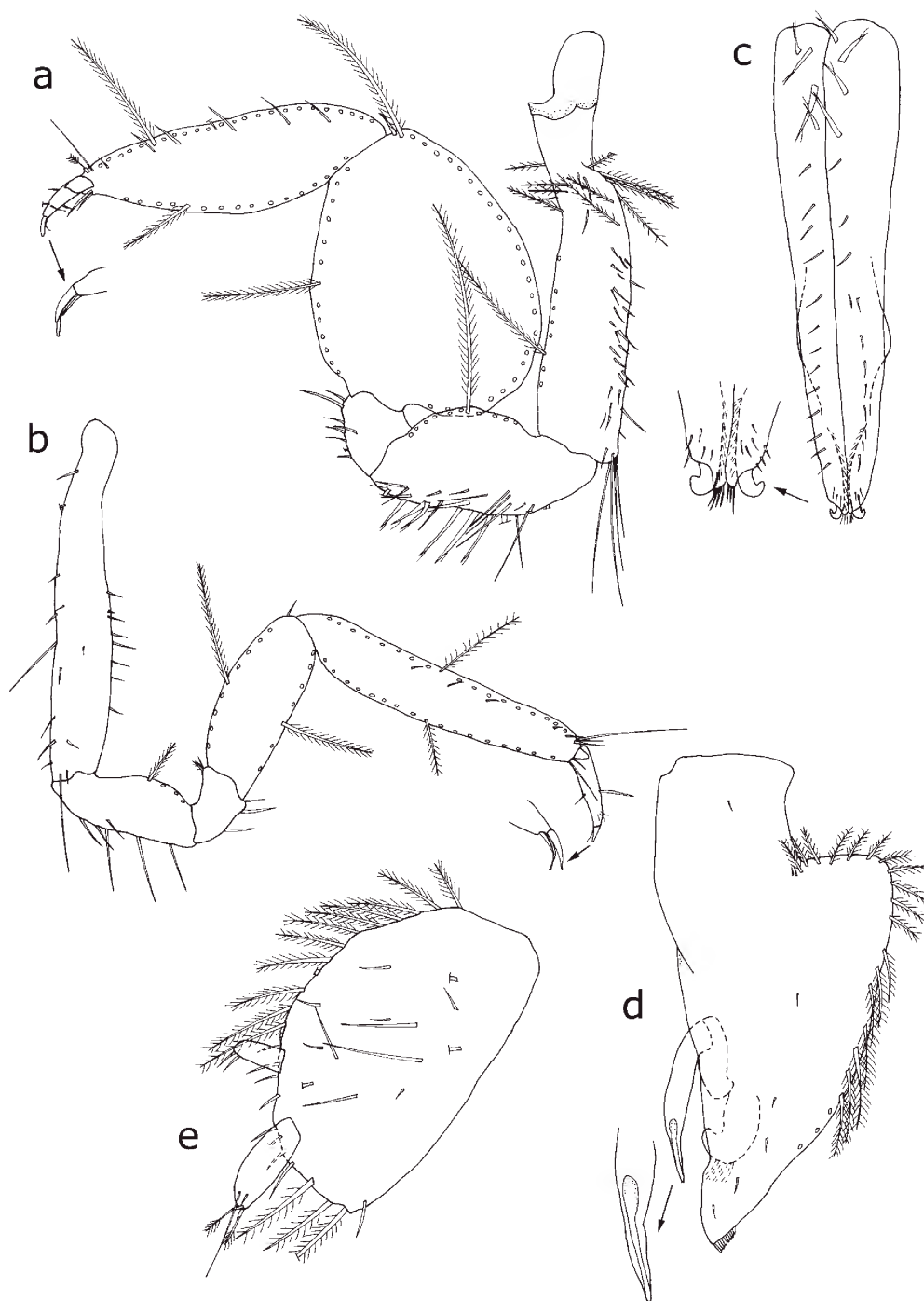


Figure 4. *Epikopais poorei* gen. nov., sp. nov. a, b, e, female paratype, 2.3 mm (NMV J18845); c, d, male paratype, 2 mm (NMV J54112): a, right pereopod 6; b, left pereopod 7; c, pleopod 1; d, left pleopod 2; e, left uropod.



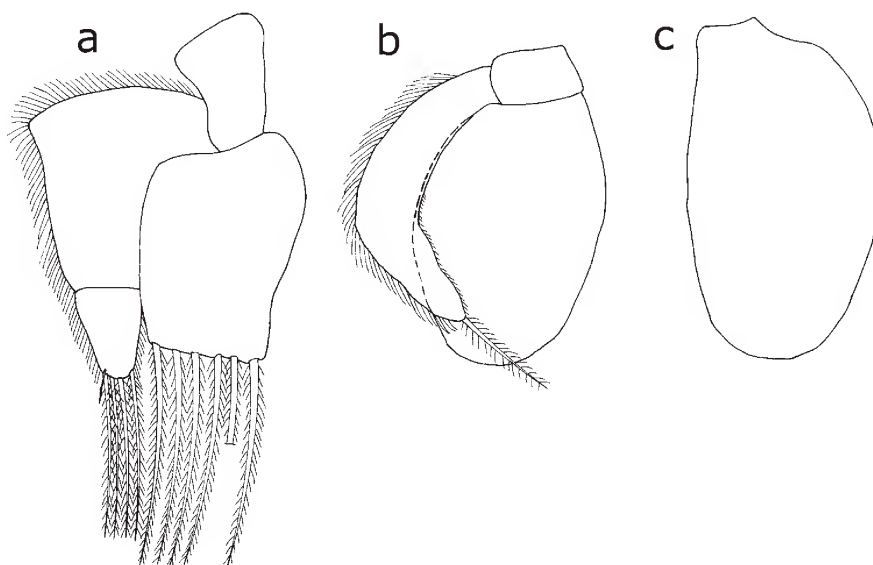


Figure 5. *Epikopais poorei* gen. nov., sp. nov. All figures from female paratype, 2.3 mm (NMV J18845): a, right pleopod 3; b, right pleopod 4; c, right pleopod 5.

RS, mesial lobe distally with many fine SS and 2 long pectinate setae. Maxilla 2 lateral lobe margins with fine SS; middle lobe width 1.2 times lateral lobe width; mesial lobe width 2.2 times lateral lobe width, margins with fine SS, proximally mesial margin also with 8 elongate setae (unable to tell what type), distally with 3 blunt SS, 4 toothed setae, 1 long pectinate seta and few fine SS. Maxilliped coxa length 0.9 times width, and 3.2 times basis length; basis length 3.7 times width, with 5 SS, distolateral margin with 1 SS; endite with 4 coupling hooks, 2 toothed setae, 4 fan setae and few fine SS; palp article 1 distolateral margin with 1 SS, distomesial margin with 1 SS; article 2 length 3.2 times article 1 length, lateral margin with cuticular scales and 4 SS, surface with 6 SS, mesial margin with 2 distally pappose setae and 2 SS; article 3 length 1.6 times article 1 length, lateral margin with 1 SS, mesial margin with 4 SS and 11 distally pappose setae; article 4 length 0.7 times article 1 length, mesial margin with 4 distally pappose setae; article 5 length 0.6 times article 1 length, lateral margin with 1 SS, distally with 2 SS and 2 distally pappose setae; epipod length 2.0 times width, margins with cuticular scales and surface with scattered SS.

Pereopod 1 basis length 4.9 times width, lateral surface with 18 SS, superior margin with 16 SS; ischium length 3.2 times width, inferior margin with 4 SS, lateral surface with 7 SS, superior margin with 4 SS and 1 RS; merus length 0.9 times width, inferior margin with 3 SS and 5 RS, lateral surface with 1 SS, distosuperior margin with 2 SS; carpus length 2.1 times width, inferior margin with 5 SS, superior margin with 4 SS; propodus length 5.4 times width, inferior

margin with 6 SS, lateral surface with 3 SS, superior margin with 4 SS; dactylus length 3.4 times proximal width, distosuperior margin with 3 small SS.

Pereopod 2 broken; ischium damaged, inferior margin with 18 sensillate RS, lateral surface with 5 sensillate RS and 36 SS; merus length 1.7 times width, inferior margin with 10 sensillate RS, lateral surface with 4 SS and 6 sensillate RS, superior margin with 2 sensillate RS, distosuperior margin with 2 sensillate RS and 1 SS; carpus length 5.1 times width, inferior margin with 17 sensillate RS, lateral surface with 10 sensillate RS and 4 SS, superior margin with 19 sensillate RS and 1 penicillate seta; propodus length 8.0 times width, inferior margin with 8 sensillate RS, lateral surface with 3 sensillate RS and 2 SS, distal margin with 7 SS, superior margin with 1 penicillate seta, 8 sensillate RS and 7 SS; dactylus length 4.5 times proximal width, superior margin with 6 SS, inferior margin with 2 SS and 3 sensillate RS.

Pereopod 3 basis length 1.2 times width, inferior margin with 2 sensillate RS and 7 SS, lateral surface with 15 SS, superior margin with 5 penicillate setae and 5 SS; ischium length 5.2 times width, inferior margin with 8 sensillate RS and 3 SS, lateral surface with 55 sensillate RS, superior margin with 14 sensillate RS; merus length 2.6 times width, inferior margin with 6 sensillate RS, lateral surface with 5 sensillate RS, distosuperior margin with 3 sensillate RS; carpus length 9.9 times width, inferior margin with 12 sensillate RS, lateral surface with 11 SS, 1 penicillate seta and 6 sensillate RS, superior margin with 11 sensillate RS; propodus damaged; dactylus absent.

Pereopod 4 basis length 1.2 times width, inferior margin with 5 sensillate RS and 2 SS, lateral surface with 6 SS, superior margin with 3 sensillate RS and 6 SS, distally with 5 penicillate setae; ischium length 4.7 times width, inferior margin with 1 SS and 8 sensillate RS, lateral surface with 4 sensillate RS, superior margin with 9 sensillate RS, distally with 11 sensillate RS; merus length 3.8 times width, inferior margin with 6 sensillate RS, lateral surface with 2 sensillate RS, superior margin with 7 sensillate RS; carpus length 10.6 times width, inferior margin with 17 sensillate RS and 1 SS, lateral surface with 1 SS and 13 sensillate RS, superior margin with 1 penicillate seta, 14 SS and 18 sensillate RS; propodus length 12.4 times width, inferior margin with 14 sensillate RS, lateral surface with 5 SS and 6 sensillate RS, superior margin with 9 SS, 1 penicillate seta and 10 sensillate RS; dactylus length 5.4 times proximal width, inferior margin with 3 sensillate RS and 4 SS, superior margin with 6 SS.

Pereopod 5 basis length 3.4 times width, inferior margin with 11 SS, lateral surface with 9 sensillate RS and 27 SS, superior margin with 5 penicillate setae and 2 SS; ischium length 2.2 times width, inferior margin with 7 sensillate RS and 9 SS, lateral surface with 14 SS; merus length 1.2 times width, inferior margin with 7 SS, distosuperior margin with 1 short plumose setae; carpus 2.4 times as long as wide, distosuperior margin with 1 SS; propodus length 2.4 times width, lateral surface with 12 SS, superior margin with 1 sensillate RS and 1 penicillate seta; dactylus length 3.1 times proximal width, with 4 SS.

Pereopod 6 basis length 4.9 times width, inferior margin with 8 SS and 4 plumose setae, lateral surface with 4 plumose setae and 25 SS, superior margin with 1 SS and row of plumose setae; ischium length 1.9 times width, inferior margin with 8 sensillate RS and 4 SS, lateral surface with 12 SS and 3 sensillate RS; merus length 1.3 times width, inferior margin with 7 SS, lateral surface with 1 SS; carpus length 1.2 times width, distosuperior margin with 1 sensillate RS; propodus length 3.1 times width, distoinferior margin with 2 SS, lateral surface with 7 SS, distosuperior margin with 1 SS and 1 penicillate seta; dactylus length 3.4 times proximal width, inferior margin with 1 SS, lateral surface with 1 SS and superior margin with 2 SS.

Pereopod 7 basis length 6.3 times width, inferior margin with 8 SS, lateral surface with 6 SS, superior margin with 8 SS; ischium length 2.2 times width, inferior margin with 6 SS; merus length 1.1 times width, inferior margin with 3 SS, distosuperior margin with 1 SS and 1 short plumose seta; carpus length 2.3 times width, distosuperior margin with 1 SS; propodus length 5.2 times width, distoinferior margin with SS, lateral surface with 4 short SS, distosuperior margin with 4 SS; dactylus length 3.4 times proximal width, with 4 SS.

Operculum length 2.8 times proximal width, distally with medial excision and veined lamellar extension, medial keel with row of RS and SS, surface with scattered SS, margins anterolaterally with 4 SS, laterally with numerous plumose setae. Pleopod 3 endopod length 1.5 times width, with 6 long plumose setae; exopod with 4 long plumose setae and 1 SS. Pleopod 4 endopod length 1.4 times width. Pleopod 5 length 1.8 times width.

Uropod protopod length 1.7 times width, lateral margin with 6 SS and 12 plumose setae, distal margin with 4 SS and 3 plumose setae, surface with 13 scattered SS; exopod length 0.2 times protopod length, with 2 SS; endopod length 0.3 times protopod length, with 2 penicillate setae and 3 SS.

*Male.* Antenna 1 of 28 articles; article 1 length 1.4 times width, lateral margin with 1 SS, surface with 1 penicillate seta, distomesial corner with 3 sensillate RS and 1 penicillate seta; article 2 length 0.6 times that of article 1, distal margin with 3 sensillate RS, distal extension with 3 penicillate setae; article 3 with 1 SS; article 4 with 2 penicillate setae; terminal article with 2 SS and 1 penicillate seta. Antenna 2 article 1 missing, article 2 damaged, with 2 SS; article 3 with 3 sensillate RS, scale with 3 RS; article 4 with no ornamentation; article 5 longer than articles 1–4, mesial margin with 12 sensillate RS, surface with 9 RS, lateral margin with 13 sensillate RS and 1 penicillate seta, distal margin with 1 sensillate RS; article 6 longer than article 5, mesial margin with 11 sensillate RS, surface with 38 sensillate RS, lateral margin with 15 sensillate RS; flagellum of 31 articles, each setose.

Pleopod 1 length 4.2 times proximal width, ventral surface with 37 SS and 8 sensillate RS, distal lobes with 8 SS. Male pleopod 2 protopod length 2.1 times width, lateral margin with 2 SS and row of plumose setae, surface with 6 SS, distally with lamellar extension; exopod elongate and hooked, length 0.1 times protopod length; stylet short, length 0.4 times protopod length, terminating to a point; sperm duct length 0.3 times stylet length.

*Remarks.* *Epikopais poorei* sp. nov. is distinguished from all other species in this genus by: body dorsally covered with setae; small anterolateral cephalic flanges; a small seta on the mandible in the approximate location of the palp; elongate operculum keel and an elongate uropodal protopod. *E. poorei* sp. nov. is further distinguishable from *E. waringa* sp. nov. and *E. mystax* sp. nov. as this species does not have any elongate setae on the frons above the labrum and the endopod of pleopod 3 has many more plumose setae than found in the other two species.

*Distribution.* South-eastern Australia, from Nowra, NSW to south of Point Hicks, Victoria, from depths between 400–930 m.

*Etymology.* For Gary Poore, who was my undergraduate honours supervisor between 2000–2001 and was the first to introduce me to asellote isopods.

#### *Epikopais mystax* sp. nov.

Figures 6–7

*Material examined.* All off South Island, New Zealand. Holotype. Female (3.0 mm), Bounty Trough, stn S151, 45°45.8'S, 174°30.5'E, epibenthic sled, 26 September 1979, 1586 m, RV *Tangaroa* (NIWA 23790). Paratypes. Female (2.7 mm, dissected), Bounty Trough, stn S153, 45°21.1'S, 173°35.8'E, epibenthic sled, 27 September 1979, 1386 m, RV *Tangaroa* (NIWA 23791). Female (undissected), type locality (NIWA 23792).

*Description. Female.* Body length 2.1 times width of pereonite 2; cuticle not highly calcified. Cephalon smooth; anterior



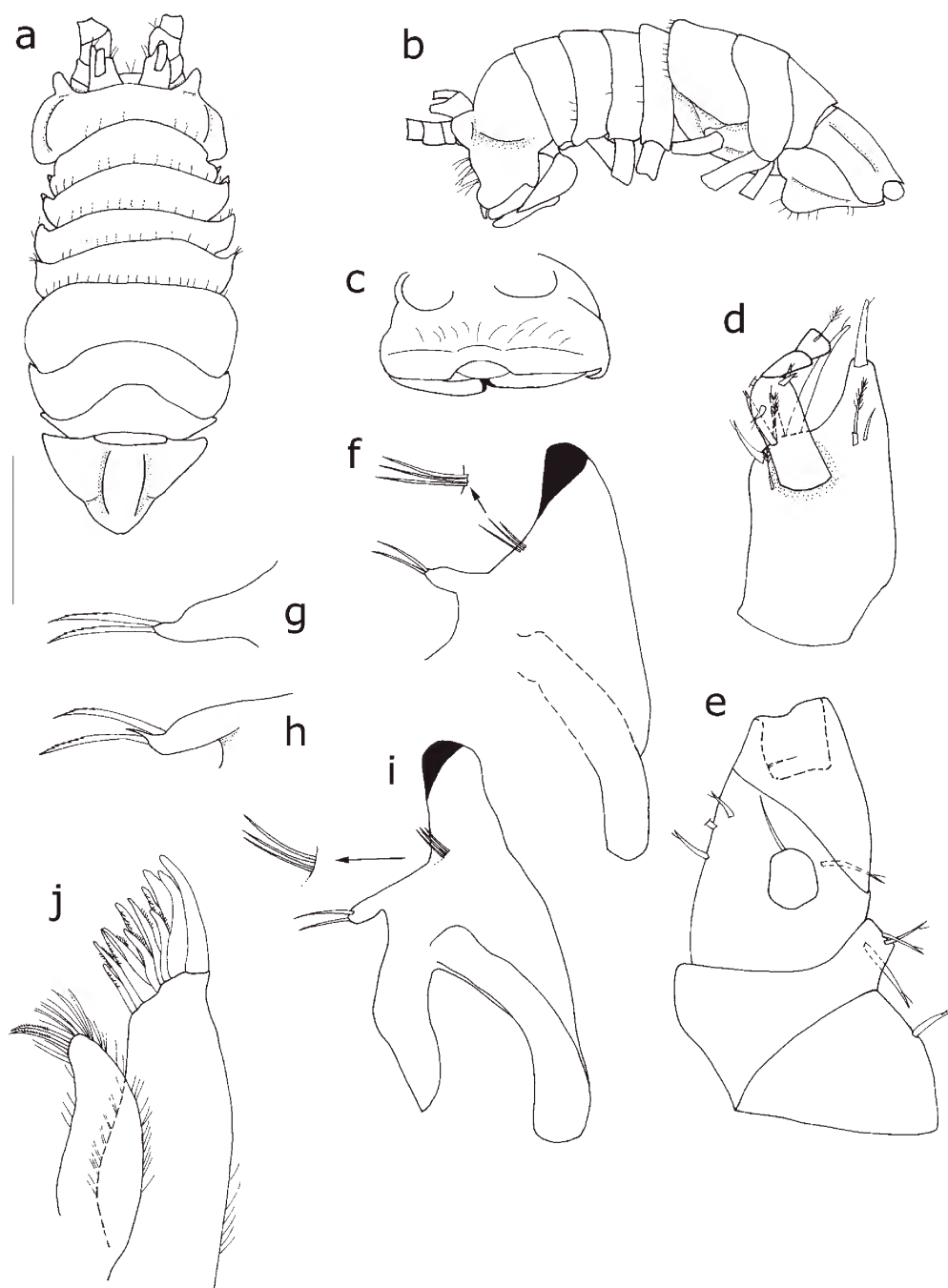


Figure 6. *Epikopais mystax* gen. nov., sp. nov. a–c, female holotype, 3.0 mm (NIWA 23790); d–j, female paratype, 2.7 mm (NIWA 23791): a, dorsal view; b, lateral view; c, cephalon; d, right antenna 1; e, right antenna 2; f, left mandible; g, left mandibular molar; h, right mandibular molar; i, right mandible; j, left maxilla 1. Scale bar = 1 mm, for dorsal and lateral views only.

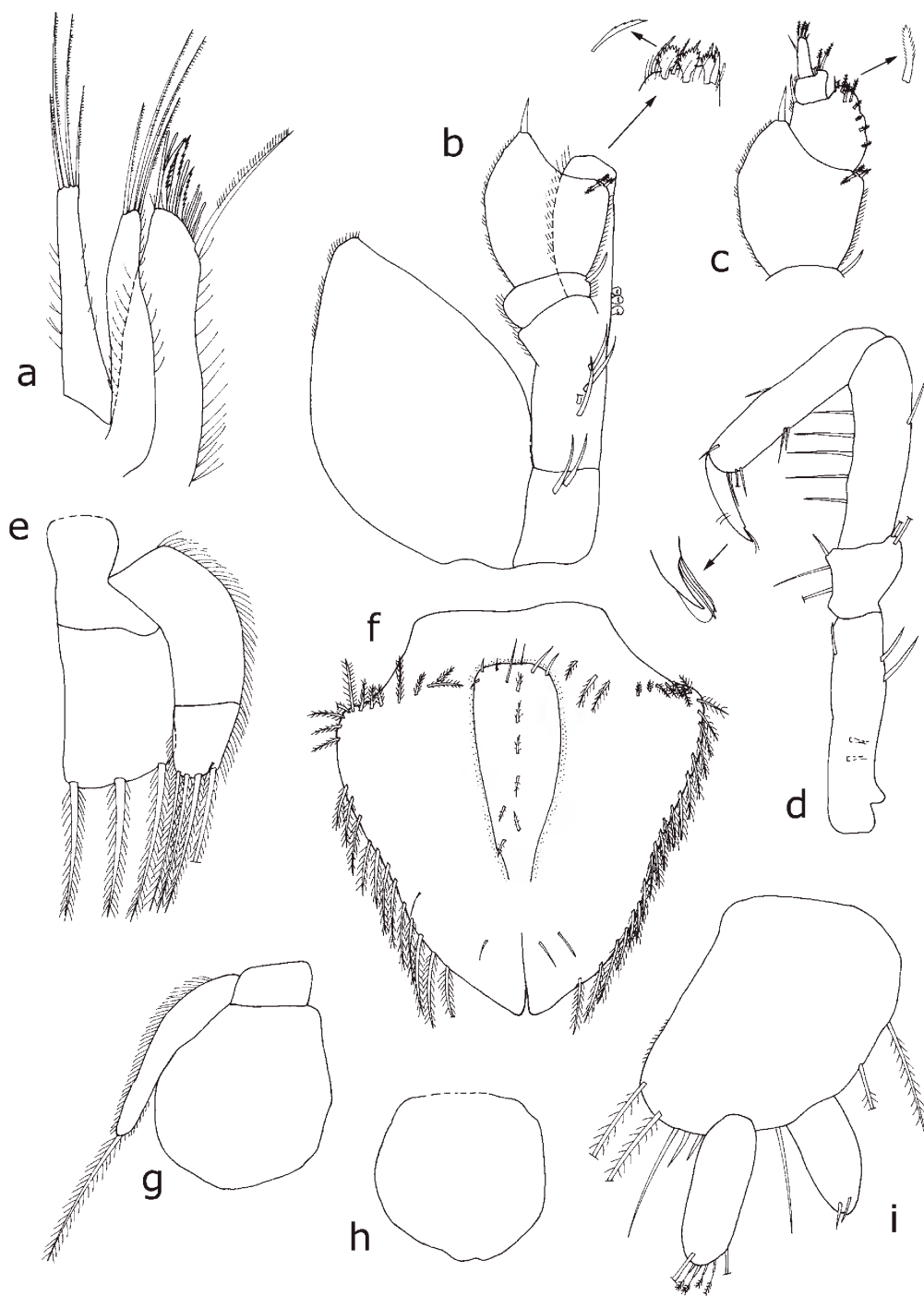


Figure 7. *Epikopais mystax* gen. nov., sp. nov. a–c, e, g, h, female paratype, 2.7 mm (NIWA 23791); d, f, i, female holotype, 3.0 mm (NIWA 23790): a, right maxilla 2; b, right maxilliped; c, right maxilliped palp; d, left pereopod 1; e, left pleopod 3; f, operculum; g, right pleopod 4; h, left pleopod 5; i, right uropod.

cephalic flanges flap-like. Frons with long SS. Pereonites 1–5 anterior margins with SS; anterolateral margins of pereonites 3–4 with anteriorly facing lobes. Pereonite 6 and 7 ventrally without ornamentation. Pleon length 0.7 times proximal width.

Antenna 1 article 1 length 2.1 times width, distal end with narrow extension, surface with 2 penicillate setae and 1 SS, distal margin with 5 sensillate RS and 1 penicillate seta; article 2 length 0.4 times article 1 length, distally with 4 sensillate RS; article 4 with 1 penicillate seta. Antenna 2 article 1 lateral margin with 1 sensillate RS; article 2 length equals article 1 length, distolateral margin with 3 sensillate RS; article 3 length 1.4 times article 1 length, with 4 sensillate RS, scale with 1 SS; article 4 length 1.3 times article 1 length, with 1 SS.

Mandible spine row present, with 3 short spines; molar distally with 2 serrate setae; right molar with distal denticle. Maxilla 1 lateral and mesial margins with fine SS; lateral lobe width 1.5 times mesial lobe width, distal margin with few fine SS, 3 RS, 4 dentate RS, 4 pectinate RS, and 1 bi-serrate RS, mesial lobe distally with many fine SS and 2 long pectinate setae. Maxilla 2 lateral lobe margins with fine SS; middle lobe width equals lateral lobe width; mesial lobe width 2.0 times lateral lobe width, mesial and distal margins with fine SS, distally also with 6 blunt SS, 3 toothed setae and 1 long pectinate seta. Maxilliped coxa rectangular, length 1.3 times width, and 0.3 times basis length, with 2 RS; basis length 3.6 times width, with 4 RS; endite with 3 coupling hooks, 4 toothed setae, 4 fan setae and few fine SS; palp article 1 with cuticular scales, distomesial margin with 1 RS; article 2 length 4.4 times article 1 length, lateral margin with cuticular scales and 1 distal RS, mesial margin with 3 distally pappose setae; article 3 length 2.3 times article 1 length, lateral margin with 1 RS, mesial margin with 2 SS and 7 distally pappose setae; article 4 length 0.9 times article 1 length, with 2 distally pappose setae; article 5 length 1.1 times article 1 length, lateral margin with 1 SS distally with 3 distally pappose setae and 1 SS; epipod length 1.6 times width, margins with cuticular scales.

Pereopod 1 broken; ischium length 4.1 times width, inferior margin with 1 SS, lateral surface with 2 sensillate RS (on opposable surface), superior margin with 2 RS; merus length equals width, inferior margin with 3 SS, distosuperior margin with 2 SS; carpus length 3.4 times width, inferior margin with 5 SS, superior margin with 1 SS; propodus length 4.3 times width, inferior margin with 5 SS, superior margin with 2 SS; dactylus length 3.8 times proximal width, superior margin with 2 SS.

Operculum length 2.1 times proximal width, distally with medial excision and veined lamellar extension, medial keel with row of short, plumose setae, proximally with 7 SS, distal surface with few scattered SS, lateral margins with numerous plumose setae, extending proximally towards keel. Pleopod 3 endopod length 1.4 times width, with 3 long plumose setae; exopod with 4 long plumose setae and 1 SS. Pleopod 4 endopod length 1.2 times width. Pleopod 5 length equals width.

Uropod protopod length 1.3 times width, margins with cuticular scales, lateral margin with 2 plumose setae, distal margin with 4 SS and 2 plumose setae; exopod 0.4 times protopod length, with 2 SS; endopod 0.6 times protopod length, with 5 penicillate setae and 2 SS.

*Males* are not known from this species.

**Remarks.** *Epikopais mystax* sp. nov. is distinguished from the other species of *Epikopais* by: the length of pereonites 1–4 being more elongate when compared to the natasome than seen in the other species of this genus; a row of simple setae along anterior margin of pereonite 5; and the frons with numerous long setae. *E. mystax* sp. nov. is most similar to *Epikopais waringa* sp. nov., but differs on several features. *E. mystax* sp. nov. has many more elongate setae on the frons and the body is much narrower than in *E. waringa* sp. nov. Pereonites 1–4 are more elongate in comparison to pereonites 5–7 in *E. mystax*, while in *E. waringa* sp. nov. pereonites 1–4 are shorter in comparison to pereonites 5–7. The operculum keel of *E. mystax* sp. nov. is more elongate and less triangular than in *E. waringa* sp. nov.

**Distribution.** Bounty Trough, South Island, New Zealand, between 1386–1586 metres.

**Etymology.** *Mystax* is Greek, meaning hair on the upper lip, in reference to the many long setae present on the frons.

### *Epikopais waringa* sp. nov.

Figures 8–11

**Material examined.** All material from south-eastern Australia. Holotype, Female (2.0 mm), off Freycinet Peninsula, Tas., stn SLOPE 47, 41°58.60'S, 148°38.80'E, 27 July 1986, WHOI epibenthic sled, 500 m, RV *Franklin*, coarse shell (NMV J18860). Paratypes. 1 female (2.0 mm), type locality, (NMV J54113). 1 male (1.5 mm, dissected), south of Point Hicks, Vic., stn SLOPE 34, 38°16.40'S, 149°27.60'E, 23 July 1986, WHOI epibenthic sled, 800 m RV *Franklin*, (NMV J18859).

**Additional material.** 1 female, south of Point Hicks, Vic., stn SLOPE 32, 38°21.90'S, 149°20.0'E, 23 July 1986, WHOI epibenthic sled, 1000 m RV *Franklin* (NMV J18858).

**Description.** *Female.* Body length 1.6 times pereonite 2; cuticle not highly calcified, smooth. Cephalon anterior margins with few scattered setae; anterior cephalic flanges flap-like. Pereonites 1–4 anterior margins with SS, pereonite 5 anterior margin smooth; anterolateral margins of pereonites 3 and 4 with small lobes; pereonites 6 and 7 ventrally with no ornamentation. Pleon length 0.7 times proximal width, with scattered SS.

Antenna 1 of 8 articles; article 1 with distal extension, length 1.8 times width, distal margin with 1 RS, 2 SS and 1 penicillate seta, distal extension with 1 penicillate seta; article 2 length 0.5 times article 1 length, distal margin with 2 penicillate setae; article 4 with 2 penicillate setae; terminal article with 1 SS and 1 aesthetasc.

Operculum length 4.1 times proximal width, medial keel wide, flat, rounded, with few plumose setae and laterally with many fine SS, distal surface with 1 plumose seta and few scattered SS, distally with medial excision, margins anterolaterally with 5 sub-marginal SS (2+3), laterally with numerous plumose setae.

**Male.** Antenna 1 of 31 articles; article 1 length 1.6 times width, distal margin with 3 sensillate RS, 1 penicillate seta and 1 SS, distal extension with 1 sensillate RS; article 2 length 0.5 times article 1 length, distal margin with 2 penicillate setae; article 3 with 1 SS; article 4 with 2 penicillate setae; article 7 with 1 SS; terminal article with 1 SS and 1 aesthetasc.

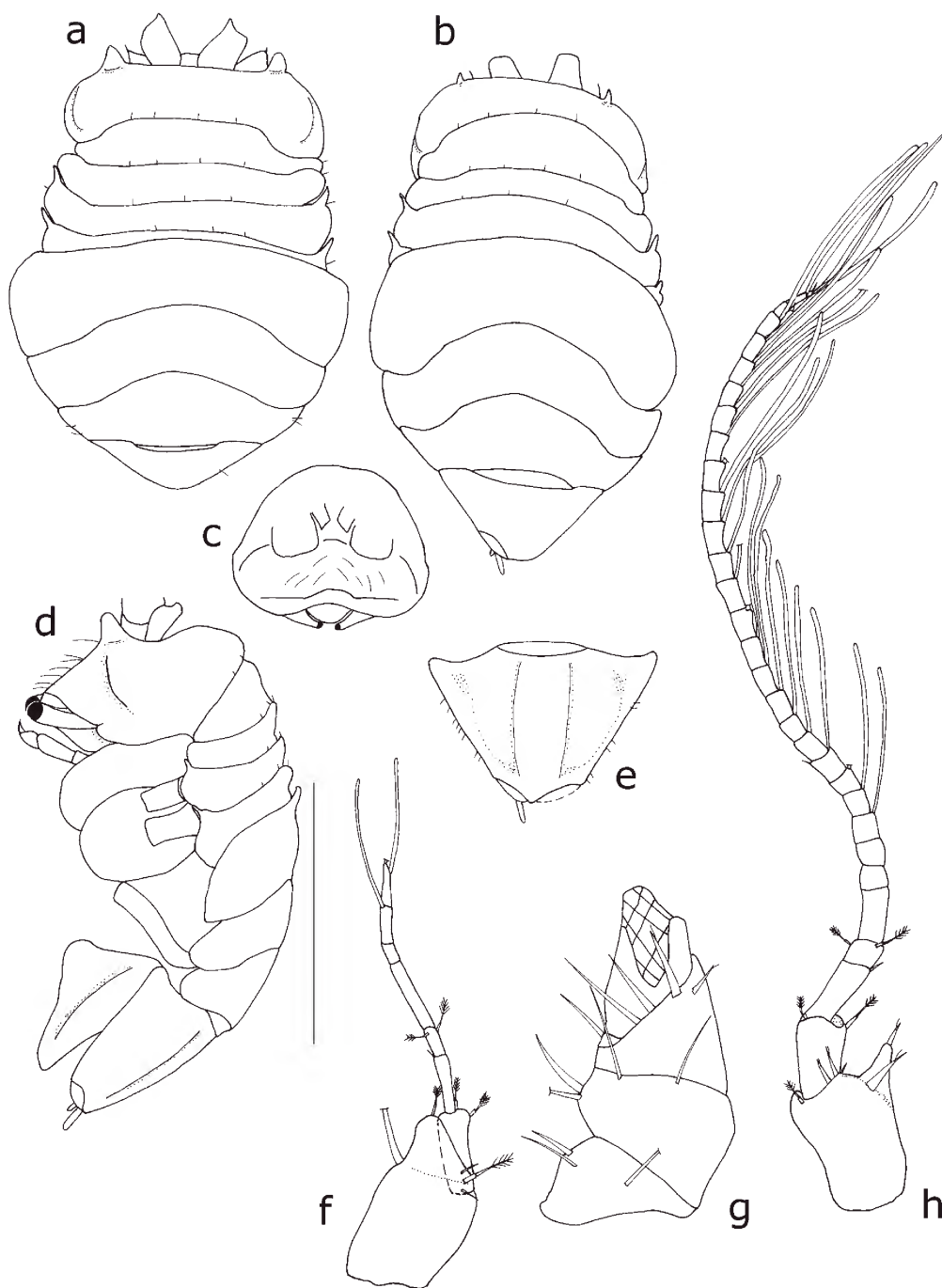


Figure 8. *Epikopais waringa* gen. nov., sp. nov. a–e, female holotype, 2.0 mm (NMV J18860); f, female paratype, 2.0 mm (NMV J54113); g, h, male paratype, 1.5 mm (NMV J18859): a, dorsal view, natasome curled under; b, dorsal view, natasome flat; c, cephalon; d, lateral view; e, dorsal view of pleon; f, left antenna 1; g, right antenna 2; h, left antenna 1. Scale bar = 1 mm, for dorsal and lateral views only.

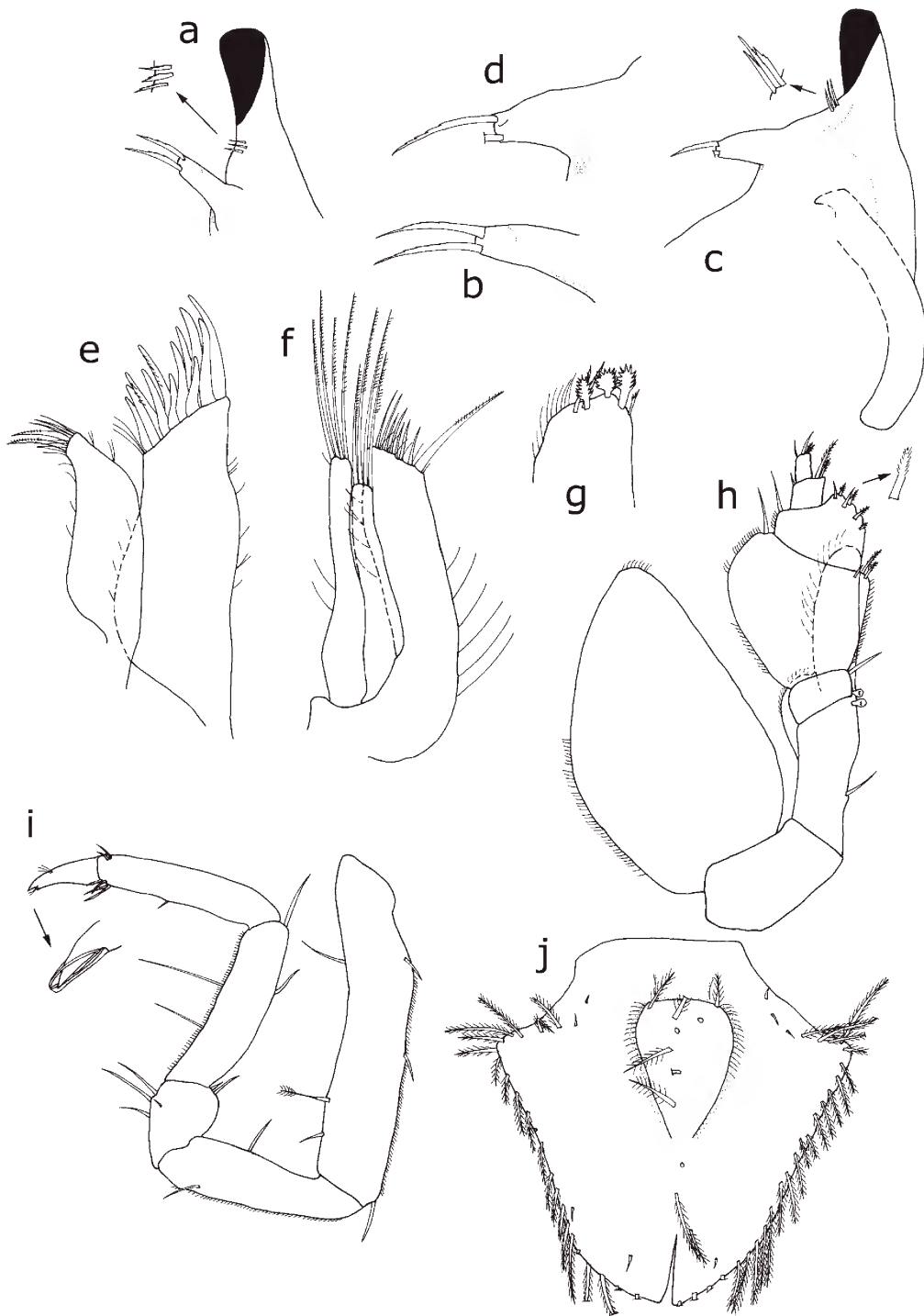


Figure 9. *Epikopais waringa* gen. nov., sp. nov. a–i, male paratype 1.5 mm (NMV J18859); j, female paratype, 2 mm (NMV J54113): a, right mandible; b, right mandibular molar; c, left mandible; d, left mandibular molar; e, left maxilla 1; f, right maxilla 2; g, right maxilliped endite; h, right maxilliped; i, left pereopod 1; j, operculum.



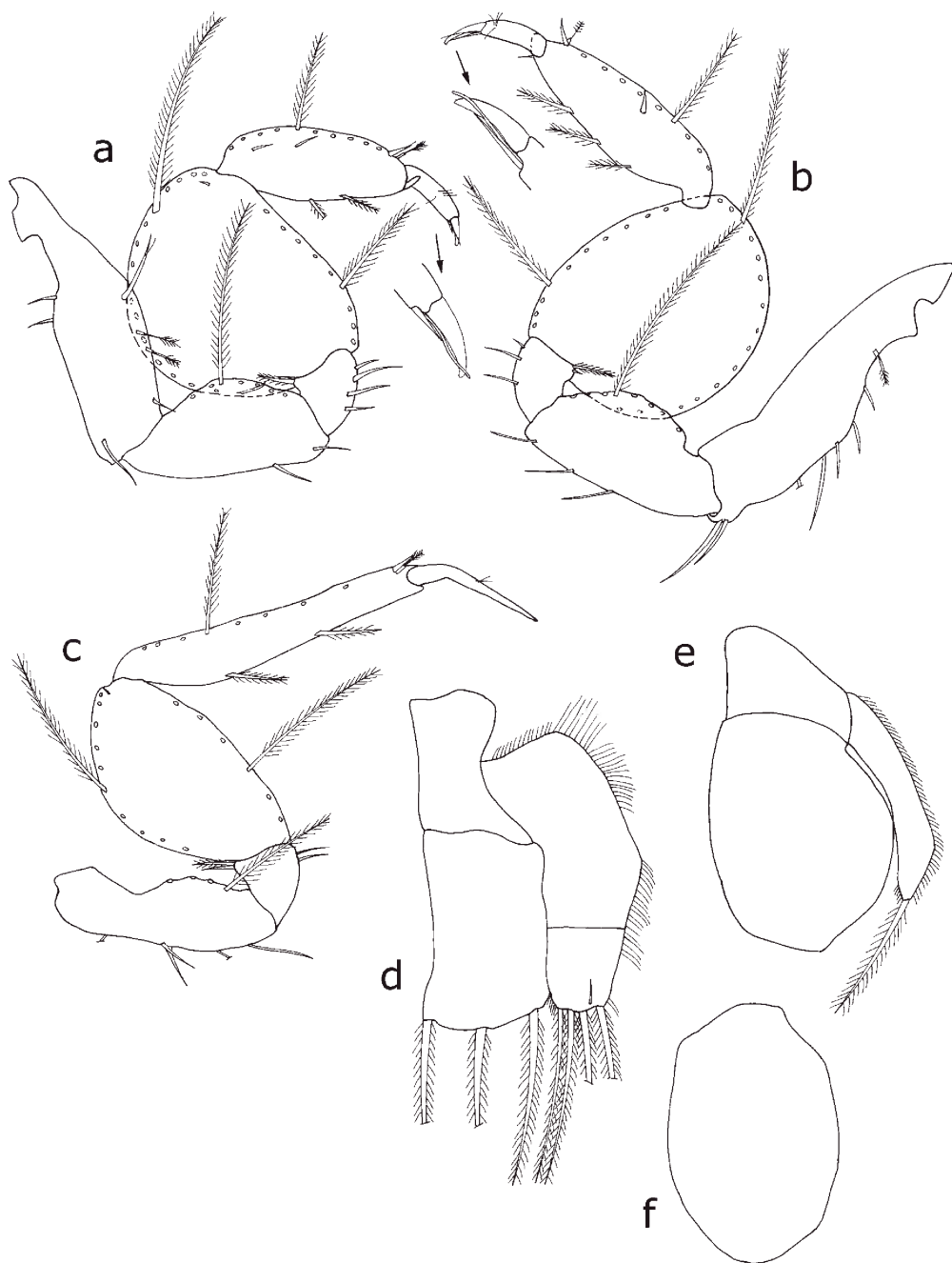


Figure 10. *Epikopais waringa* gen. nov., sp. nov. All figures from male paratype, 1.5 mm (NMV J18859): a, right pereopod 5; b, left pereopod 6; c, right pereopod 7; d, left pleopod 3; e, right pleopod 4; f, left pleopod 5.

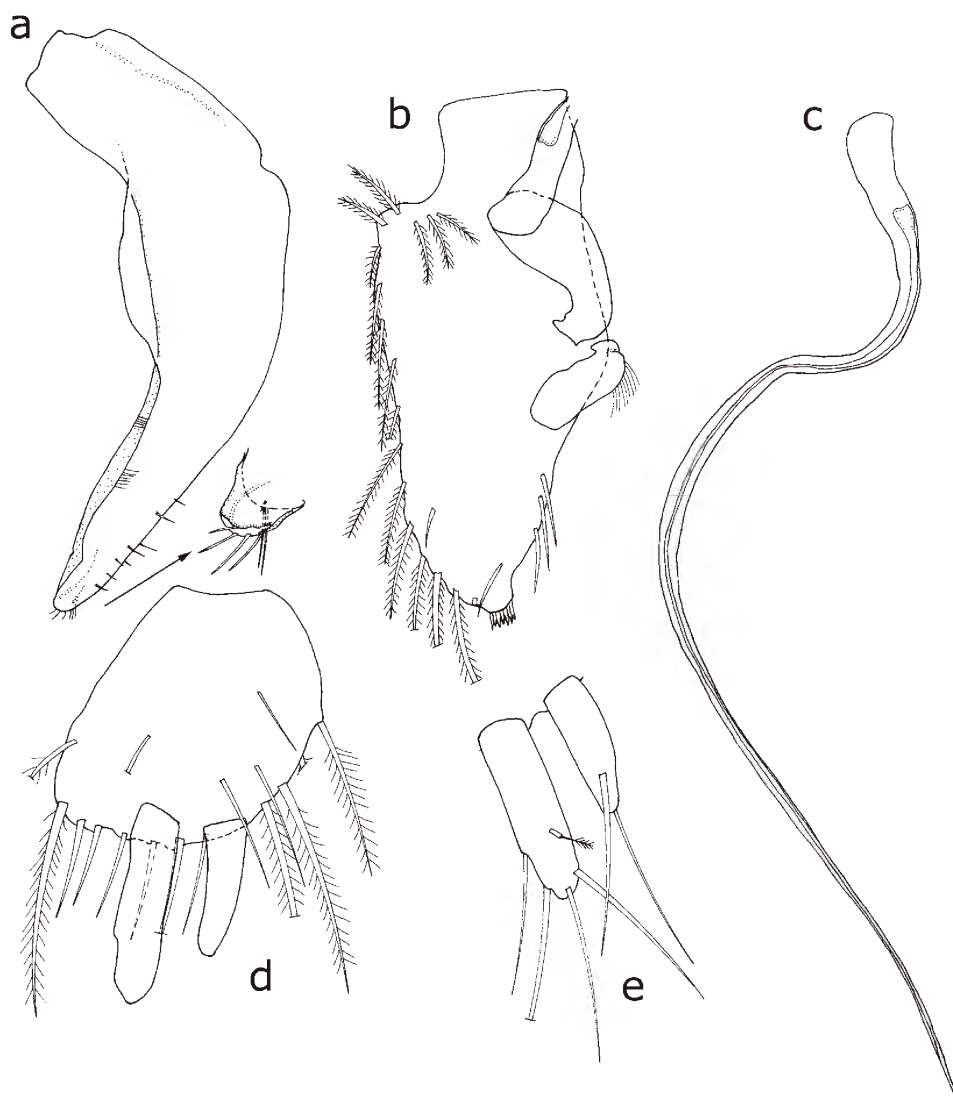


Figure 11. *Epikopais waringa* gen. nov., sp. nov. All figures from male paratype, 1.5 mm (NMV J18859): a, male pleopod 1; b, left pleopod 2; c, left pleopod 2 stylet; d, left uropod; e, endopod and exopod of left uropod.

Antenna 2 damaged; article 1 lateral margin with 1 RS, surface with 2 SS; article 2 length 1.3 times article 1 length, distolateral margin with 2 RS distally with 2 SS; article 3 length 1.4 times article 1 length with 2 sensillate RS and 3 RS along distal rim, scale with 1 RS; article 4 length 1.7 times article 1 length, with no ornamentation.

Mandible spine row present, with 3 short spines; molar distally with 2 serrate setae. Maxilla 1 lateral and mesial margins with fine SS; lateral lobe width 1.5 times mesial lobe width, distal margin with few fine SS, 10 RS and 2 dentate RS,

mesial lobe distally with 3 SS, few fine SS and 2 long pectinate setae. Maxilla 2 lateral lobe margins with fine SS; middle lobe as wide as lateral lobe; mesial lobe width 1.7 times lateral lobe width, mesial and distal margins with fine SS, distally with 7 setae (unable to identify type) and 1 long pectinate seta. Maxilliped coxa length 1.7 times width, and length 0.5 times basis length; basis length 4.2 times width, with 1 SS; endite with 2 coupling hooks, 2 toothed setae, 4 fan setae and few fine SS; palp article 1 distomesial margin with 1 SS; article 2 length 4.2 times article 1 length, lateral margin with cuticular scales

and 1 SS, mesial margin with 2 distally pappose setae and 1 SS; article 3 length 1.9 times article 1 length, lateral margin with 1 SS, mesial margin with 2 SS and 4 distally pappose setae; article 4 length 0.8 times article 1 length, lateral margin with 1 SS and 2 distally pappose setae; article 5 length 0.6 times article 1 length, with 2 SS and 2 distally pappose setae; epipod length 1.6 times width, margins with cuticular scales.

Pereopod 1 basis length 4.6 times width, inferior margin with cuticular scales, and 3 SS, superior margin with 2 SS and 1 penicillate seta; ischium length 3.5 times width, inferior margin with 1 SS and cuticular scales, superior margin with 1 SS; merus length 1.3 times width, inferior margin with 3 SS, lateral surface with 1 SS, distosuperior margin with 2 SS; carpus length 3.6 times width, inferior margin with 2 SS and cuticular scales, superior margin with 2 SS; propodus length 4.9 times width, inferior margin with 5 SS (4 distally), distosuperior margin with 2 SS; dactylus length 2.6 times proximal width, distosuperior margin with 3 SS.

Pereopod 5 basis length 3.0 times width, inferior margin with 3 SS, superior margin with 1 sensillate RS, 2 penicillate setae and 1 SS; ischium length 1.8 times width, inferior margin with 2 SS, superior margin with 1 SS; merus length 1.3 times width, inferior margin with 4 SS, distosuperior margin with 1 SS and 1 plumose seta; carpus length 1.3 times width, lateral surface with 1 SS; propodus length 2.5 times width, lateral surface with 2 SS, distosuperior margin with 1 sensillate RS and 1 penicillate seta; dactylus length 2.7 times proximal width, with 4 small SS.

Pereopod 6 basis length 3.7 times width, inferior margin with 7 SS and 1 penicillate seta; ischium length 1.9 times width, inferior margin with 3 SS; merus length 1.4 times width, inferior margin with 3 SS, distosuperior margin with 1 SS and 1 plumose seta; carpus length 1.1 times width; propodus length 2.9 times width, distally with 1 SS, superior margin with 2 RS and 1 penicillate seta; dactylus length 3.1 times proximal width, with 4 small distal SS.

Pereopod 7 basis missing; ischium length 2.9 times width, inferior margin with 5 SS; merus length 1.3 times width, inferior margin with 2 SS, distosuperior margin with 1 plumose setae and 1 SS; carpus length 1.7 times width, distosuperior margin with 1 SS; propodus length 5.2 times width, distosuperior margin with 1 sensillate RS and 1 penicillate seta; dactylus length 7.1 times proximal width, superior margin with 2 SS; unguis damaged.

Male pleopod 1 length 6.7 times proximal height, central margin with 8 SS, distally with 7 SS. Male pleopod 2 protopod length 2.2 times width, lateral margin with row of plumose setae, surface with 2 SS, distally with lamellar extension, mesial margin with 3 SS; exopod length 0.2 times protopod length with fine SS; stylet long, hooked up into protopod, length 2.5 times protopod length; sperm duct length 0.8 times stylet length. Pleopod endopod length 1.5 times width, with 3 long plumose setae; exopod with 4 long plumose setae and 1 SS. Pleopod 4 endopod length 1.3 times width. Pleopod 5 length 1.5 times width.

Uropod protopod length 1.3 times width, lateral margin with 3 plumose setae, distal margin with 1 plumose setae and 6 robust SS, mesial margin with 1 plumose seta, surface with 3 SS; exopod length 0.5 times protopod length, with 2 SS; endopod length 0.7 times protopod length, with 4 SS and 1 penicillate seta.

**Remarks.** *Epikopais waringa* sp. nov. is defined by: the wide body, which is about 0.7 times as wide as long; anterior margins of pereonites 1–4 with few simple setae; and the triangular operculum keel. For further discussion refer to the comments for *E. mystax* sp. nov.

**Distribution.** South-eastern Australia, from Point Hicks, Victoria to Freycinet Peninsula, Tasmania, between 500 and 1000 metres.

**Etymology.** Waringa is an Aboriginal word meaning sea; noun in apposition.

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